Abstracts

T. KISHIMA, S. HAYASHI and M. TAKAHASHI: **Trip for actual survey of bio-deterioration and durability of timber produced in Southeast Asia**, TONAN AJIA KENKYU (THE SOUTHEAST ASIAN STUDIES) **9**, 302 (1971).

M. TAKAHASHI and T. KISHIMA: **Decay Resistance of Sixty-Five Southeast Asian Timber Specimens in Accelerated Laboratory Tests**, TONAN AJIA KENKYU (THE SOUTHEAST ASIAN STUDIES), **10**, 525 (1973).

Decay resistance of sixty-five specimens of Southeast Asian timbers, which covered 23 families, including 37 genera, was tested in laboratory sand block tests against a soft rot fungus, *Chaetomium globosum* KUNZE, and a white rot fungus, *Coriolus versicolor* QUÉL. It was shown that there was a tendency, especially in the case of *Co. versicolor*, for dense and/or extractive-rich species to be more resistant to decay, and that the greater part of extractive-rich species became more susceptible to decay after treatment with hot methanol. *Ochanostachys amentacea, Scorodocarpus borneensis, Eusideroxylon zwageri, Cantleya corniculata, Shorea exelliptica, Shorea hypoleuca* and *Shorea laevis* retained high resistance even after the treatment. In addition, different reactions to methanol extractives between the two test fungi were observed in several species.

S. HAYASHI, T. KISHIMA, L. C. LAU, T. M. WONG and P. K. B. MENON: **Micrographic Atlas of Southeast Asian Timber**, 120, Index 8, publ. Division of Wood Biology, Wood Res. Inst., Kyoto Univ. (1973).

This Atlas has been published by the five authors listed above, and includes 239 wood species (130 genera, 48 families) among the over 2000 species of wood growing in Southeast Asia. Each of the species provides the structural three sections without any descriptive matter.

Among the authors, S. HAYASHI and T. KISHIMA visited the Forest Research Institute at Kepong in February, 1971, and took these wood micrographs from the slides originally made by B. MENON and others.

The contained species are not enough for a complete reference but do include many important ones. It is desirable that such attempts as this Atlas be continuously carried on to cover all the timber species of Southeast Asia in the near future.

K. NISHIMOTO: **The distribution of termites in Europe and America**, SHIROARI, No. 18, 15 (1973).

History of termite introduction or interception is related to the distribution of termites in some countries. The history is illustrated on Hawaii, U. S. America, and West Germany.

K. NISHIMOTO: **Introduction of BAM (Federal Institute for Material Testing, Germany)**. WOOD INDUSTRY **28**(5), 23 (1973).

The present BAM (Bundesanstalt für Materialprüfung) which has been established as the Chemisch-Technische Reichsanstalt at Aug. 1, 1945, and reorganized at Feb 10, 1956, after expansion of several times, consists of 6 divisions, each division of 4 departments, and each department of 4 laboratories.

Abstracts

T. HIGUCHI : **Chemistry of Lignin-With Reference to Plant Evolution**, KAGAKU, **28**, 226 (1973).

Chemical structure and the biosynthetic pathway of lignin in conifers and angiosperms were discussed at enzymic level in relation with plant evolution. Forty five literatures were included.

T. HIGUCHI : **Chemistry of Hardwood Lignins**, **Wood Research Review**, No. 7, 1 (1973).

Chemical characteristics and biosynthesis of hardwood lignins were reviewed and discussed. Controling factors in the formation of syringyl lignin were discussed based on the recent biochemical investigation. Fifty seven literatures were included.

T. YAMASAKI, K. HATA and T. HIGUCHI : **Dehydrogenation Polymer of Sinapyl Alcohol**, MOKUZAI GAKKAISHI, **19**, 299 (1973).

Dehydrogenation polymer of sinapyl alcohol was prepared with peroxidase and hydrogen peroxide. The polymer contained 28.56 % of methoxyl group and gave HIBBERT'S ketones with syringyl group in 16 % yield. The results showed that the polymer composed of syringaresinol structure and syringylglycerol-β-sinapyl alcohol structure, and the possible occurrence of syringyl lignin in the cell wall of hardwoods.

M. SHIMADA, H. FUSHIKI and T. HIGUCHI : **Mechanism of Biochemical Formation of the Methoxyl Groups in Softwood- and Hardwood Lignins**, MOKUZAI GAKKAISHI, **19**, 13 (1973).

The differences in the methoxyl patterns between softwood- and hardwood lignins were explained in terms of the different functions (differences of substrate specificities) of *O*-methyltransferases (OMT) which participate in methylation of the hydroxycinnamic acid intermediates in biosynthetic pathway of these two types of lignins.

OMT was extracted for the first time from gymnosperm species such as Japanese black pine and ginkgo. This enzyme was localized in the hypocotyls and roots of the pine seedlings but little in the leaves. The increase in OMT activity was correlated with lignin formation in the growing seedlings. The gymnospermous OMT catalyzed preferentially the methylation of caffeic acid (CA) to ferulic acid (FA, guaiacyl unit) but hardly methylated 5-hydroxyferulic acid (5-HFA) to sinapic acid (SA, syringyl unit). On the other hand, angiospermous OMT from bamboo, poplar, and angiospermous callus tissues are all capable of methylating both CA and 5-HFA, yielding guaiacyl (V) and syringyl (S) components of lignins, respectively. Thus, OMT from, gymnosperms were found to differ in substrate specificity from that of angiosperms. From these functional differences of OMT, the gymnospermous enzyme was named "mono-function OMT," and the angiospermous one, "di-function OMT," respectively, for the sake of convenience. The ratios of SA-activity to FA-activity (the SA/FA ratios) for various plant OMT were correlated with the S/V ratios obtained from the lignins of softwoods and hardwoods. One of the reasons why gymnospermous plants including conifers lack syringyl lignin was explained in terms of the narrow substrate specificity of gymnospermous OMT as well as the lack of "FA-5-hydroxylase" in them.

R. MARTON, P. RUSHTON, J. S. SACCO and K. SUMIYA : **Dimensions and Ultrastructure in Growing Fibers**, Tappi, **55**, 1499 (1972).

The formation and growth of fibers was studied on spruce seedlings of various ages and on a full-grown spruce tree. X-ray methods were used for measurement of S2 fibrillar angle, crystallite dimensions, and crystallinity indices. Fiber geometry was determined by light microscopy. It was found that cellulosic crystallites are already present as very short entities in the cambial cells. Young seedlings, as well as the newest growth, also have short crystallites which gradually become longer with maturation of the tree. Simultaneously, the fibers grow in size. Since the width of the crystallites does not increase substantially during the same period, it is assumed that they grow by addition of new links to the ends of existing cellulose chains. The crystallinity index follows the same trend as crystallite length : a continuous increase from the cambium to the more developed wood. The fibrils in the young cell form a large angle to the fiber axis and then gradually become more parallel to the axis on maturation. Ultrastructural data obtained with compression wood (higher than normal lignin content) and tension wood (lower lignin content than normal wood) show that lignin regulates (inhibits) the development of the crystalline structure.

K. SUMIYA : **Cell Wall Extension on a Physical View**, MOKUZAI GAKKAISHI, **19**, 1 (1973).

This review looks into the mechanism of enlargement of a primary cell wall in plant on the stand-point of a physical view.

There are many evidences to show that the motive power of cell enlargement is rather the turgor pressure than the apposition of the newly formed materials. On the other hand, it is assumed that the wall extensibility, the other factor controlling the rates of cell enlargement, is changing with any biochemical modification in wall extesion processes. The wall extensibility is lately measured in tests such as the Instron technique. It seems to this reviewer that further work on wall extesibility should be directed towards the chemo-rheological considerations.

The direction to which a cell extents may be controlled by the action of the surface layer of protoplasm where the unknown functional structures exist.

T. YAMADA : **Material Design of Wood. Wood Research Review**, No. 17, 64 (1973).

Presents a review of the composite structure and properties calculation for wood. Heterogeneity arising in process of formation of wood, favourable consequence of the heterogeneity and application of composite rule, with particular reference to dielectric properties, elastic constants and distribution of stresses, are discussed.

T. YAMADA, K. SUMIYA, M. NORIMOTO, T. NOMURA, Y. HASEGAWA, T. OHGAMA, T. AOKI and M. MORI : **Short Manual on Wood Mechanics IX, Wood Research Review**, No. 7, 79 (1973).

H. KANEDA and T. MAKU : **Studies on the Weatherability of Composite Wood. I.** A Few Changes of Material Property of Lauan Plywood by Exterior Exposure, MOKUZAI GAKKAISHI, **19**, 157 (1973).

In order to investigate the weatherability of lauan plywood under exposure, exterior exposure test was done as follows :

1. Observation of surface checks.

2. Measurement of amount of absorbed water, percentage of shrinkage and swelling, and Brinell hardness.

The results are summarized as follows :

1. As a characteristic of surface deterioration, surface checks were observed and measured by naked eye and microscope. Measurement of checks were carried out as follows:

1) Total length of checks per 20 cm^2.

2) Number of checks on a measurement line, 4 cm.

3) The growth and number of checks per 80 mm^2 in each part of wood tissue, namely, vessel, ray and wood fiber.

It was recognized that these values increased with exterior exposure. Especially, remarkable delaminations in the inside and its neighbourhood of ray were recognized.

2. The amount of absorbed water of exposed specimen increared in comparison with unexposed ones. Especially, in the case of 280 days exterior exposure, amount of absorbed water increased in 6～24 hours of soaking remarkably.

3. Percentage of shinkage and swelling of exposed specimen showed a tendency of decreasing, to some extent, in the case of parallel to fiber direction and of no change in the case of perpendicular to fiber direction.

4. Brinell hardness of surface of exposed specimen decreased in comparison with that of unexposed ones.

H. KANEDA and T. MAKU: **Studies on the Weatherability of Composite Wood. II.** An Observation of Surface Deterioration of Lauan Plywood by Exterior Exposure. MOKUZAI GAKKAI-SHI, **19**, 215 (1973).

This report deals with the delamination of wood tissue itself of surface layer of exterior lauan plywood as one of the indicators evidencing deterioration by exterior exposure.

Moreover, accelerated aging test according to the method of WCAMA committee was done in comparison with exposure test.

The results are summarized as follows:

1) The resistance to delamination of wood tissue itself showed a tendency to decrease, to some extent, in exposure test. In two years of exterior exposure, unpainted specimens retained 60 to 70 percent of their original resistance to delamination of wood tissue itself. This value corresponded to that of 15～20 cycles of accelerated aging test.

2) The acrylic resin painted plywood showed much more resistance to delamination of wood tissue itself of surface layer than that of unpainted plywood. It was recognized that the existence of painting had considerable influence on resistance to delamination of wood tissue itself of surface layer.

3) It was recognized that the difference of depth of cutting between 0.5 mm and 1.0 mm had no influence on resistance to delamination of wood tissue itself of surface layer.

H. SASAKI, E. MCARTHUR and J. W. GOTTSTEIN: **Maximum Strength of End-Grain To End-Grain Butt Joints**, Forest Products J., **23**, (2), 48 (1973).

A reservoir method of adhesive application compensating for end-grain penetration was used to investigate variables influencing tensile strength of end-grain butt joints with epoxy adhesive. The variables studies were wood species, surface quality, adhesive flexibility, and thickness of glue line. Results were interpreted by fracture theory using a new concept-apparent flaw size-the equivalent effect of actual flaws (bent fibers, air bubbles, and debris). Apparent flaw size gives a useful index of end-grain gluability, and emphasizes the major influence of surface preparation. Flexibilizers enhance multiaxial straining effects but lessen cohesion. As wood porosity increases, the apparent flaw size needed to initiate fracture decreases. The best ways to improve the butt-joint strength using epoxy resin are to have undamaged surfaces, to use adhesives that are flexible but have good cohesion, and to ensure a good supply of adhesive during the flow phase prior to gelation.

H. SASAKI and E. MCARTHUR: **Improving Scarf Joint Strength**, Forest Products J., **23**, (5) 37 (1973).

A reservoir type bonding technique, which was developed for improving end-grain to end-grain butt joint gluing of wood with epoxy resins, has been applied successfully to the gluing of scarf joints. It is shown that for practical purposes the full tensile strength of the timber (kauri) may be obtained with a scarf as steep as 1 in 4. A comparison of the results with other published data has shown the surprising superiority of this new method.

T. MAKU: **Trees in the Su'tra** (2), **Wood Research Review**, No. 7, 18 (1973).

Informations on significances and properties of trees in the Su'tra were given.

The 25th Public Lecture held by the Wood Research Institute (May 24th, 1973, Osaka).

M. MASUDA: Mechanical Characteristics of Plywood Shells

H. SASAKI: Research and Development on Laminated Veneer Lumber

T. MAKU: Wood Frame House Construction in Canada and United States of America